

WHAT IS CLAIMED IS

1. An antenna, comprising:

a plurality of planar conductors, each of said planar conductors defining a broad side and an edge, said plurality of planar conductors being placed in an array with said broad side of each planar conductor parallel with the broad side of other planar conductors of said plurality, and with said edges of said plurality of planar conductors in registry with corresponding edges of others of the plurality to thereby define a discontinuous surface;

a plurality of plated-through vias interconnecting said plurality of mutually parallel planar conductors to thereby define a matrix of conductors; and

an electromagnetic radiating element for transmitting/receiving electromagnetic waves, said radiating element being located adjacent said surface but spaced therefrom, and comprising an electrical conductor lying generally parallel with said surface.

2. An antenna according to claim 1, wherein said electromagnetic radiating element defines a feed point, said antenna further comprising:

an electrical conductor connected to said feed point, said electrical conductor extending perpendicular to said surface and at least into a plane defined by said matrix of conductors, electrically isolated from said matrix of conductors.

3. An antenna according to claim 1, wherein

said electromagnetic radiating element for transmitting/receiving electromagnetic waves comprises an electrically conductive material lying in a plane parallel to said surface, said electrically conductive material being electrically isolated from said matrix of conductors, said electrically conductive material defining an electrically nonconductive region, the dimensions of which region are selected for transmitting/receiving over a predetermined electromagnetic frequency range.

4. An antenna according to claim 3, further comprising:

an aperture-exciting electrically conductive element lying between said electrically nonconductive region and said matrix of conductors; and

a feed conductor in contact with said aperture-exciting electrically conductive element and extending from said aperture-exciting electrically conductive element perpendicularly toward said matrix of conductors.

5. An antenna according to claim 4, wherein said feed conductor extends through a plane of said surface.

6. An antenna according to claim 5, wherein said feed conductor extends through said matrix of conductors.

7. An antenna according to claim 3, wherein

said electrically nonconductive region comprises an aperture in said electrically conductive material.

8. An antenna according to claim 7, wherein said aperture of said electrically conductive material is in the general form of a rectangle.

9. An antenna according to claim 8, wherein said rectangle is a square.

10. An antenna according to claim 2, wherein said electromagnetic radiating element defining a feed point is in the general form of a rectangle, and said feed point comprises a conductive projection from a side of said rectangle, said conductive projection lying in a plane orthogonal to said electrical conductor extending perpendicular to said surface.

11. An antenna according to claim 10, wherein said conductive projection projects from a center of a side of said rectangle.

12. An antenna according to claim 2, wherein said electromagnetic radiating element defining a feed point is in the general form of a square, and said feed point comprises a conductive projection extending from a side of said square.

13. An antenna, comprising:

a plurality of layers of solid dielectric material, each of said layers defining first and second broad surfaces, first and second side edges, and an end edge, said plurality of layers being juxtaposed to define a stack of dielectric layers, each interior layer of said stack of dielectric layers having said first broad surface adjacent said second broad surface of the next adjacent dielectric layer of said stack, and each interior dielectric layer of said stack having said second broad surface adjacent said first broad surface of the next adjacent dielectric layer, each broad surface of a layer of said stack which is juxtaposed with an adjacent broad surface defining a juncture, said juxtaposed end edges of said stack of dielectric layers defining an end surface;

a ground plane associated with said stack of dielectric layers, said ground plane comprising a layer of electrically conductive first material lying in each of said junctures at a location spaced by a predetermined distance from said end surface;

said ground plane further comprising a plurality of electrically conductive through vias extending through and electrically interconnecting said layers of electrically conductive first material at locations spaced by at least said predetermined distance from said end surface, whereby said stack comprises both dielectric and electrically conductive materials;

an electrically conductive electromagnetic radiating structure attached to said end surface for transmitting/receiving electromagnetic radiation; and

a feed structure lying within said stack for transferring electromagnetic energy with said radiating structure.

14. An antenna according to claim 13, wherein said electrically conductive materials comprise metallizations cofired with said dielectric layers to form a rigid solid.

15. An antenna according to claim 13, wherein said radiating structure comprises at least;

an electrically conductive element affixed to said end surface of said stack and defining at least one feed point; and said feed structure comprises

an electrically conductive second material other than said electrically conductive first material and electrically isolated therefrom, said electrically conductive second material lying in the plane of at least one of said junctures and being electrically connected to said feed point.

16. An antenna according to claim 15, wherein said electrically conductive element of said radiating structure comprises a rectangular element.

17. An antenna according to claim 16, wherein said rectangular element is square.

18. An antenna according to claim 16, wherein

said feed point comprises a projection from a side of said rectangular element.

19. An antenna according to claim 17, wherein said feed point comprises a projection from a side of said square element.

20. An antenna according to claim 13, wherein said electrically conductive electromagnetic radiating structure attached to said end surface for transmitting/receiving electromagnetic radiation comprises a nonconductive region: and

said feed structure lying within said stack comprises a conductive excitation region lying between said electromagnetic radiating structure and said ground plane, and not in contact with either, for exciting said nonconductive region.

21. An antenna according to claim 20, wherein said nonconductive region of said electrically conductive electromagnetic radiating structure comprises an aperture.

22. An antenna according to claim 20, further comprising a feed transmission conductor connected to said conductive excitation region, said feed transmission conductor extending from said conductive excitation region perpendicularly toward said ground plane.